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or the country of deep wells; sheet No. 10 gives the western half of the Sahara, and shows the routes of travelers, with many notes on the inhabitants, nature of the country, and position of the oases and wells and sheet No. 11 has a portion of the Ahaggar region, of which little is really known, and the better known Tuat oasis——M. Giraud has finally been compelled to desist from his attempted explorations. His men deserted him, retaining the French flag and Chassepôt rifles, and turned highwaymen on their way back to Zanzibar, where they were cast into prison by the French consul.——Major Serpa Pinto is at Mjuani, on the shores of the fine harbor of Nakala, which extends inward from Fernão Veloso bay.——M. F. S. Arnot has sent to the Royal Geographical Society a sketch-map of his route from Shoshong to Bihé. He followed the Zambesi, from his point of crossing, a little above Victoria falls to Lialui, from which he proceeded west-north-west to the great plateau on which Bihé is situated.——Petermann's Mittheilungen (31 Band, 1885, III) contains a map of Zululand and the gold fields of the South African republic, with a description. The previous issue gives a chart of Stellaland.

GEOLOGY AND PALÆONTOLOGY.

Sir William Dawson on the Mesozoic Floras of the Rocky Mountain region of Canada.[1]—In a previous memoir, published in the Transactions of the Royal Society of Canada, Vol. I, the author had noticed a Lower Cretaceous flora consisting wholly of pines and cycads, occurring in the Queen Charlotte islands, and had described a dicotyledonous flora of Middle Cretaceous age from the country adjacent to the Peace river, and also the rich Upper Cretaceous flora of the coal formation of Vancouver's island—comparing these with the flora of the Laramie series of the Northwest Territory, which he believed to constitute a transition group connecting the Upper Cretaceous with the Eocene Tertiary.

The present paper referred more particularly to a remarkable Jurasso-cretaceous flora recently discovered by Dr. G. M. Dawson in the Rocky mountains, and to intermediate groups of plants between this and the Middle Cretaceous, serving to extend greatly our knowledge of the Lower Cretaceous flora, and to render more complete the series of plants between this and the Laramie.

The oldest of these floras is found in beds which it is proposed to call the Kootanie group, from a tribe of Indians of that name who hunted over that part of the Rocky mountains between the 49th and 52d parallels. Plants of this age have been found on the branches of the Old Man river, on the Martin creek, at Coal creek, and at one locality far to the north-west on the Suskwa river. The containing rocks are sandstones, shales and conglomerates, with seams of coal, in some places anthracitic. They may be traced for 130 miles in a north and south direction, and form troughs included in the Palæozoic formations of the mountains. The plants found are conifers, cycads and ferns, the cycads being especially abundant and belonging to the genera Dioonites, Zamites, Podozamites and Anomozamites. Some of these cycadaceous plants, as well as of the conifers, are identical with species described by Heer from the Jurassic of Siberia, while others occur in the Lower Cretaceous of Greenland. The almost worldwide *Podozamites lanceolatus* is very characteristic, and there are leaves of *Salisburya sibirica*, a Siberian Mesozoic species, and branches of *Sequoia smittiana*, a species characteristic of the Lower Cretaceous of Greenland. No dicotyledonous leaves have been found in these beds, whose plants connect in a remarkable way the extinct floras of Asia and America and those of the Jurassic and Cretaceous periods.

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[1] Read before the Royal Society of Canada, May, 1885.

Above these are beds which, with some of the previous species, contain a few dicotyledonous leaves, which may be provisionally referred to the genera Sterculia and Laurus; and still higher the formation abounds in remains of dicotyledonous plants of which additional collections have been made by Mr. T. C. Weston. The beds containing these, though probably divisible into two groups, may be named the Mill Creek series, and are approximately on the horizon of the Dakota group of the United States geologists, as illustrated by Lesquereux and others. The species are described in the paper, and differ for the most part from those of the Dunnegan group of the Peace river series, which is probably of the age of the Niobrara group, and, of course, still more from the overlying Laramie group. With regard to the latter, the author adduced some new facts confirmatory of his previously expressed view as to the position of the Laramie at the top of the Cretaceous and base of the Eocene, and also tending to show that some of the plants still held by certain palæo-botanists to be of Miocene age are really, in Canada at least, fossils of the Laramie group, and consequently considerably older than is currently supposed. The collections of plants studied by the author had, for the most part, been placed at his disposal by the director of the Geological Survey.

THE SYNCARIDA, A GROUP OF CARBONIFEROUS CRUSTACEA.—The following are the conclusions of a paper read at the last meeting of the National Academy of Sciences. The genus Acanthotelson of Meek and Worthen was by them doubtfully referred to the Isopoda though stated to bear some resemblance to the lower Decapoda. After describing the fossils from specimens kindly loaned by Messrs. R. D. Lacoe and J. C. Carr, we arrived at the following results of a reinvestigation of the characteristics of the genus:

What we should regard as the differential characters of the group Syncarida, to which Acanthotelson belongs, are the sixteen free segments of the body which are homonomous or of uniform size; the first and second, however, being soldered together and forming the head; the absence of a true carapace; the seven pairs of schizopod-like legs, the first pair spined and raptorial, slightly reminding one of those of Squilla; the antennæ of both pairs being long and slender, the two flagella of the first pair being very unlike any sessile-eyed or edriopthalmatous crustacean; the six pairs of abdominal feet, which are long, slender and with a general resemblance to those of the Schizopoda; the broader, oar-like, swimming ramus ending in long setæ. Any doubts as to the macruran affinities of the Syncaridæ are removed by an examination of the telson and the last pair of abdominal appendages, with the long acute telson; the appendages are biramous, the divisions flattened from above downwards, so that they, with the telson, serve as in schizopods and shrimps for propelling the body backwards when the animal is disturbed.

We should regard the Syncarida as the lowest group of Thoracostraca, but much nearer the Schizopoda than the Cumacea; they form a connecting link between the Amphipoda and Thoracostraca, but at the same time in their most essential characters are much nearer to the schizopods than the Amphipoda. The lack of a carapace, even a rudimentary one, and the homonomous segmentation cause them to bear a resemblance to the Edriopthalmata which they would not otherwise present.

To the Isopoda Acanthotelson presents a superficial resemblance, due to the slightly vertically-compressed body and the homonomous segmentation. The Edriopthalmata (Arthrostraca of some late authors) are defined by Claus as "Malacostraca with lateral sessile eyes, usually with seven, more rarely with six or fewer separate thoracic segments, and the same number of pairs of legs; without a carapace; but this does not express those differences in the form of the antennæ the thoracic legs and abdominal appendages especially those of the end of the urosome or abdomen, which are characteristic of the sessile-eyed Crustacea as distinguished from the Thoracostraca.

From the Isopoda in which the body is usually broad and vertically flattened, with seven free thoracic segments, while the abdominal legs are lamellar and closely appressed to the short abdomen, our Acanthotelson plainly differs in the long biflagellate decapod-like first antennæ; in the long homonomously ringed abdomen and schizopodal abdominal feet and especially the schizopod-like telson and last pair of feet, adapted as in the shrimps for striking the water from above downwards.

The Amphipoda are in general characterized by their laterally compressed body with lamellate gills on the thoracic feet and an elongated abdomen, of which the three anterior segments bear the swimming feet, while the three posterior has posteriorly directed feet adapted for springing (Claus). Now if Acanthotelson is not an isopod, still less should it be regarded as related to the Amphipoda. The first antennæ are entirely unlike those of any known amphipod, in which there is a very short accessory flagellum ; the second antennæ of Acanthotelson are strictly decapodous in appearance and very different from that of the Amphipoda, whereas in Gammarus the scape is as long as the flagellum. Although there are seven free thoracic segments in Acanthotelson as well as in Gammarus and other Amphipoda, those of Acanthotelson are not compressed any more than in the Schizopoda, and there are no traces of epimera ; on the contrary the free edges of the thoracic and abdominal segments are much as in the Schizopoda and Caridea. The thoracic appendages of Acanthotelson are on the whole like those of the Stomapoda and Schizopoda. We cannot detect any traces of mouth parts, mandibles, with their palpus or maxillæ, etc., but the thoracic legs do not present any close resemblance to those of the Amphipoda, the first pair being as much if not more like those of Squilla than any amphipod with which we are acquainted, while the three posterior pairs which are in form and size like those in front, entirely differ from those of Gammarus and most other normal amphipods in which the basal joint is very large and triangular. Turning to the abdomen the differences of that of Acanthotelson from that of the amphipods is still more marked. The first five pairs of uropoda or abdominal appendages are in Acanthotelson all formed apparently on the same plan, not essentially different from those of schizopods, while the last pair are flat and on the same plane as the telson and intimately associated with the latter, in that these parts are formed on a truly macrurous plan and most approach those of the schizopods, in which the telson and rami of the last pair of feet are narrow and more or less acute at the end. There is nothing in the structure of the urosome and its uropoda in Acanthotelson to remind us of the same parts in the Amphipoda.

Excluded from the sessile-eyed Crustacea, and forced to place Acanthotelson in the Thoracostraca, we are confronted by the lack of a carapace, and the homonomous segmentation of the body. These are essential, fundamental characters, but still the nature of the appendages and telson is such as to forbid us from rejecting the Syncarida from the ordinal limits of the Thoracostraca. We are compelled to regard the group as a suborder standing near or at the base of the Thoracostraca, not far from the Stomapoda and Schizopoda, and with appendages closely homologous with those of these two groups. The Syncarida, in their lack of a carapace and in the well-formed dorsal arch of the seven thoracic segments, we are obliged to consider as an annectant group, pointing to the existence of some extinct group which may have still more closely connected the sessile-eyed and stalk-eyed Crustacea.—*A. S. Packard.*

MARSH ON THE DINOCERATA.[1]— This work, which has been announced for some time, is now before us. It is one of the quarto series of the United States Geological Survey, but the present edition was published, we are informed, by the author at his own expense. The mechanical execution of the book is good, and it will remain a monument to its authors. We confess, however, to surprise at not finding it, as we had anticipated, a monograph of the group. According to the synopsis of twenty-nine reputed species, which forms the last part of the volume, a great deal of material representing them has been obtained by Professor Marsh, but we have searched in vain for a description of the greater part of it in the work. The memoir is in fact of a rather general character, giving descriptions of the osteology of the two species *Loxolophodon mirabile* and *L. ingens*,[2] with occasional references to others. It is evident that the greater part of the work of writing this monograph remains to be done. We should have preferred to have seen this magnificent opportunity improved, so that it should have embraced detailed descriptions of those characters of all the species on which alone the derivation theory can be established or refuted. A natural result of this neglect is a failure to appreciate the true generic relationships of the species. There are no sufficient characters adduced for the generic discrimination of the species included under the heads Dinoceras and Tinoceras, while the characters of Uintatherium are erroneously given. The distinct genus Bathyopsis is not admitted, and there are two distinct genera, represented by species described by Professor Marsh, which are not recognized.[2]

Professor Marsh thinks that the females of these animals had shorter canine teeth than the males, and that the protective mandibular flange is correspondingly small in that sex. He also finds variation in the nasal tuberosities, and indicates that these also are larger in male animals.

In connection with the description of the brain of the Dinocerata, Professor Marsh gives us much new valuable information as to the brain characters of a number of extinct ungulates. He, however, fails to give Professor Lartet credit for the proposal of the general theory of brain development in the Mammalia with the progress of geological time.

The classification of the Ungulata adopted is largely that of Cope, to whom no acknowledgment is made. A hypothetical group is proposed and defined as the primitive type of Ungulata.

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[1] The Dinocerata. By O. C. Marsh.

[2] For the genera of Dinocerata, see NATURALIST, June, 1885.

Professor Marsh is apparently not aware that this group has been actually discovered, defined and extensively illustrated under the name of Condylarthra by Cope, and that its discovery was anticipated on hypothetical grounds by the same author as long ago as 1874.[1] The unwary reader may be still further impressed with the idea that all this is new, by the array of new names which are attached to these well-known natural divisions. The Condylarthra figure under another name, and those of Amblypoda and Pantodonta are changed on the pretext that they are preoccupied, though Professor Marsh does not state when or how. Careful examination has failed to reveal any real preoccupation. The nearest name to Pantodonta is Pantodon, a genus of fishes, and to Amblypoda is Amblypodia, an unused synonyme in Lepidoptera. We do not believe, however, even were the names identical, that a generic name can be preoccupied by the name of an order, or other mononomial word, or *vice versa*. The name Diplarthra (the Ungulata of Gill and Flower) is changed for a new one, and other terms are employed for the time-honored and generally used Perissodactyla and Artiodactyla of Owen. We forbear comments, remarking only that even a handsome volume like this one will not suffice to obliterate history.[2]

On p. 169, one is surprised to read the following statement: "No Cretaceous mammals are known." Two species were described from the Laramie Beds of Dakota, two or three years ago.

Professor Marsh corrects by implication a good many errors made by himself several years ago when criticising the work of another author on this group. Thus he adopts the species *Loxolophodon cornutus* Cope, and no longer considers it identical with a species subsequently described by himself. But he cannot avoid making a misrepresentation as to a photograph of this species of which a few copies were circulated at the time of its discovery. The statement that the canine tooth was attached to the skull by a plaster base so as to increase its apparent length is erroneous. The tooth was made to adhere to its base by a piece of paper which took white in the picture, and which Professor Marsh takes for granted was plaster. The reproduction of this photograph in Professor Marsh's book instead of some of the good figures which have since appeared, is apparently designed to substantiate this statement. Professor Marsh, moreover, does not recede from the erroneous position he took at that time on the question of nomenclature, but still uses generic names which have been repeatedly shown to have no right to exist if the ordinary rules of nomenclature are observed.[1] The history of the subject is concealed from the reader by the omission of reference in their proper places to the papers which antedate those of Professor Marsh, and by the omission of the dates of their publication when they are referred to.[2]

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[1] Journal of the Academy of Natural Sciences Philada. Proceedings do, 1873, Nov. 13th.

[2] See AMERICAN NATURALIST for Nov. and Dec., 1884, and Jan., 1885, on the Amblypoda.

This work will always be valuable for the descriptions and plates which it contains, and with the abatements we have already pointed out, we recommend it as the handsomest work on the subject yet published.—*E. D. Cope.*

GEOLOGICAL NEWS.—*General.*—From a paper recently read by W. H. Hudleston at the meeting of the Geologists' Association it appears that the "Nubian sandstone" comprises the strata between the crystalline rocks and the Upper Cretaceous; the lower sandstone and overlying limestone of Wady Nasb is Carboniferous; the middle division is Cenomanian, is widely extended in Egypt, occurs in great force at Petra, and constitutes the cliffs on the east side of the Dead sea; while the Lebanon division is probably well up among the Cretaceous limestones and possibly on the horizon of certain ligniferous beds occurring at Edfou on the Nile. The crystalline rocks are in two series, a lower (referred to the Laurentian) penetrated by dykes of granite and diorite; and a second series consisting mainly of porphyries permeated by dykes of feldspar and basalt. All the Nile cataracts occur where the river passes over such crystalline areas, while the tranquil stretches are upon the Nubian sandstone. The Cretaceous limestones are in Syria more important than those of Eocene age, but in Egypt the latter are much the thickest. The Cretaceous beds in Egypt are much less calcareous than those of Palestine, and abundance of rocksalt, gypsum and bitumen is noted on certain horizons (Zittel). Neither in Palestine nor in Egypt is there any sharp line of demarkation between the chalk and the Tertiary rocks. The celebrated Jebel Usdom or Salt mountain of the Red sea, is assigned to the Cretaceous by Dr. Lartet, but to the marls of the Dead Sea basin by Hull. Zittel states that the palæontological boundary between the chalk and the Eocene is clearly defined, despite the continuity of the marine deposits. The Dead sea hollow is undoubtedly an independent lake basin of high antiquity. The watershed separating it from the southern portion of the Arabah is 660 feet high, while the highest point of the Vale of Jezreel is only 285 feet. Marl deposits exist in the Dead sea basin at an elevation of 1400 feet above the present Dead sea level, and the old marls of the Jordanic lakes are not entirely unfossiliferous, as three Melanidæ have been found in them.

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[1] We take the present opportunity to refer to some similar cases of hypersensitiveness to be found in Professor Marsh's papers on the Dinosauria. The genus Megadactylus was named by Dr. Hitchcock, in 1865, from specimens from the Trias of Connecticut, but was not defined. It was defined by Cope in 1870. Professor Marsh changes the name because it had already been used by Fitzinger for a genus of lizards. But Fizinger's name is an undoubted synonyme of a well-known form, and has no status whatever. We hold that the change of name is unwarranted. The name Læelaps is also discarded for another, because the name Lelaps is used for a genus of Hymenoptera. The names are not identical, and there is no preoccupation. On the same principle Dinoceras should give way to Tinoceras of earlier date, as they differ by but a single letter, were not both names really synonymes of a still older one.

[2] See the Bibliography, p. 225.

Silurian.—Figures of the now celebrated fossil scorpions found in the Silurian rocks of Scotland and Gothland by Dr. Hunter and Professor Lindstrom, are given in *Nature* (Jan. 29), and Mr. B. N. Peach gives in the same number a compendium of our knowledge of these ancient air-breathers. The first Paleozoic scorpion found was described in 1835, by Count Sternberg, from a specimen obtained in the coal formation of Chonile, near Radnitz, in Bohemia. Three years later Corda described another (Microlabis) from the same locality. In 1866 Messrs. Meek and Worthen described two new species from the Coal Measures of Mazon creek, Illinois. In 1873, Dr. H. Woodward showed that the genus Eoscorpius (one of those found at Mazon creek) occurs in the English Coal Measures and in the Carboniferous limestone of Scotland. In 1881 Mr. Peach examined a large series of scorpions from the lowest Carboniferous of the Scotch border, and described (Trans. Edinb. Roy. Soc.) several species of Eoscorpius, with the remark that Meek and Worthen's name was unfortunate, since the dawn of the scorpion family must have been much earlier. Although Dr. Hunter's specimen was the last announced, it was obtained a year before the discovery of the Gothland specimen. It agrees with the latter (*Palæophonus nuncius*) in having pointed thoracic feet, unlike those of Carboniferous times and of the present age. Mr. Peach asks, What were the victims of these ancient murderers? The dragon-flies of the Middle Devonian of New Brunswick were thought to be the oldest land animals until Mr. Peach, in 1882, showed that chilognathous myriapods were far from uncommon in the Lower Old Red Sandstone of Forfarshire, in Scotland. There is but a short step from this to the Silurian, and M. Brongniart has found in the Silurian limestone of Calvados a fossil Blatta. Perhaps a habit of feeding on the eggs of animals left bare by the tides may account for the embedding of these air-breathers in marine strata.

Devonian.—*Hystricrinus carpenteri*, a crinoid with articulating spines, is described by G. J. Hinde in the *Ann. and Mag. Nat. Hist.*, March, 1885. The genus is identical with Arthrocanthus (Williams), a name preoccupied among the Rotatoria. Apart from the possession of articulating spines it is near Hexacrinus. The specimens are from calcareous shales of Middle Devonian at Arkona, Ontario. It is curious that in three out of the eleven examples a shell of the genus Platyceras is attached to the vault of the crinoid.

Cambrian.—Mr. Chas. D. Walcott (*Amer. Jour. of Science*, April, 1885) describes Mesonacis, a new genus of Cambrian trilobites, intermediate between Paradoxides and Olenellus, the head and first fourteen segments being of the type of the latter, while the pygidium and ten posterior segments more resemble the former. The fifteenth segment fits snugly against the fourteenth, and has a long, slender spine extending to the pygidium. *Mesonacis vermontana* occurs in the Georgian of the State it is named after.

Carboniferous.—MM. Renault and Zeiller have described a number of mosses from the carboniferous strata of Commentry (France). The mosses previously found in a fossil state have been few, and of the Tertiary epoch, principally Miocene, but the Commentry beds contain many impressions of their stems, three or four centimeters long, some simple, others with alternate fronds. The stems are usually united in tufts. The absence of any trace of the organs of fructification prevents the determination of the place of these fossils in present classifications, but MM. Renault and Zeiller think they belong rather among the acrocarps than among the pleurocarps.——T. R. Jones and J. W. Kirkby give, in the *Ann. and Mag. of Nat. Hist.* for March, a synopsis of the species of the ostracodous genus Kirkbya, eleven in number. Most of the specimens are from marine shales associated with the calcareous beds of the Carboniferous series.

Tertiary.—Mr. J. W. Judd has shown that in the Western isles of Scotland there occur a number of peridotite rocks which are the central cones of Tertiary volcanoes of vast dimensions. These Tertiary peridotites are intimately associated with the gabbros and dolerites, and present numerous variations both in structure and mineralogical constitution. Among them occur examples of the rocks which have received the names of dunite, picrite and lherzolite.——Dr. C. J. Forsyth Major (Quart. Jour. Geol. Soc., 1885) gives a list of thirty-nine species of fossil Mammalia found in the Val d'Arno. Not one of the members of the rich fauna found in the Mediterranean region and as far east as the Siwaliks of India, and existing on the boundary line between the Miocene and Pliocene, is found in the Val d'Arno, though the two antelopes, the Machairodus and the Mastodon, are closely allied. This Mediterranean fauna occurs at Casino, near Siena, and the somewhat younger fauna of the Val d'Arno was also spread as far as India. The shore deposits of the Pliocene sea in Italy are said by Dr. Major to contain the same mammalian fauna as the lacustrine deposits of the Val d'Arno. The Post-pliocene fauna exhibits several connecting links with the Pliocene, but, in Italy at least, not a single species of the older fauna seems to have gone over, as such, to the younger fauna. Not a single species of the thirty-nine is identical with those living to-day, and five genera—Machærodus, Mastodon, Leptobos, Palæoryx and Palæoreas—are extinct. Pliocene mammals, but little altered, yet occur in the Sunda islands; the Anoa is close to the Siwalik Hemibos, *Bos etruscus* is a Bibos, close to the Banting of Java, the Pliocene stags, tapirs and rhinoceroses are nearly repeated by the forms now living in Southeastern Asia, and *Sus verrucosus* of Java is close to the Pliocene *Sus giganteus.* Professor Boyd Dawkins believes that two of the deer of the Pliocene of the Val d'Arno, as also the Hippopotamus, are identical with existing species.——A before unknown deposit of Pliocene age at St. Erth's, near the Land's End, Cornwall, has yielded fifty species of mollusks, of which all but eleven or twelve are extinct.

MINERALOGY AND PETROGRAPHY.[1]

NEW MINERALS.— 1st. *Bertrandite.*—This mineral, mentioned by Bertrand in 1880 (Bul. soc. min. d. Fr., III, 96) as a probably new aluminum-silicate from Barbin, near Nantes, is shown by Damour[2] to have the composition $4BeO, 2SiO_2, H_2O$, on which account he proposes for it the above name. It occurs in druses of a coarse pegmatite. Its system of crystallization is orthorhombic; axial ratio $a:b:c = 0.5619:1:0.5871$. Observed planes $0P, \infty P, \infty P\bar{\infty}, \infty P\bar{3}, \infty P\breve{\infty}, \infty P\breve{3}, P\breve{\infty}, 3P\breve{\infty}$. Plane of the optical axes is $\infty P\breve{\infty}$. Principal bisectrix is $\breve{a}$. Dispersion $\rho < \upsilon$.[2]

2d. *Evigtokite* is a name applied by Flight[4] to a mineral of the cryolite group from Greenland having the composition CaF_2, AlF_3, H_2O. It is composed of masses of minute, white, transparent crystals.

3d. *Liskeardite* of the same writer occurs in layers sometimes a quarter of an inch thick, at the mines of Cornwall. It is fibrous in structure, of a white color or with a greenish or bluish tinge. Its composition is $(Al, Fe) AsO_4, 8H_2O$. Analysis:

Fe_2O_3	Al_2O_3	As_2O_5	SO_3	CuO	CaO	H_2O
7.64	28.229	26.962	1.111	1.027	0.719	34.053

4th. *Pinnoite* is a new borate from Stassfurt described by H. Staute.[5] Its crystal form could not be determined. Sp. gr. 2.27. Hardness 3–4. Its composition is:

MgO	B_2O_3	H_2O	Fe	Cl
24.45	42.50	32.85	0.15	0.18

which gives the formula $MgB_2O_4 + 3H_2O$.

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[1] Edited by Dr. GEO. H. WILLIAMS, of the Johns Hopkins University, Baltimore.

[2] Bull. soc. min. de Fr., VI, 1883, p. 252.

[3] Ib., p. 249.

[4] Journal Chem. Soc., Vol. 43, March, 1883, p. 140.

[5] Berichte der deutschen chemischen Gesellschaft, XVII, No. 12, p. 1584, July, 1884.